

**CLAIMS****What is claimed is:**

5           1.     An integrated circuit including a power distribution system, the integrated circuit comprising:

          a plurality of symmetrical power distribution structures associated with the power distribution system and distributed across at least a portion of a surface of the integrated circuit;

10           a plurality of circuit blocks coupled for receiving power through one or more of the plurality of power distribution structures; and

          wherein:

          (a)     each of the plurality of power distribution structures comprises:

15               (a1)   a first power line for providing a first power supply voltage; and

              (a2)   a second power line and a third power line for providing a second supply voltage, wherein the second power line and the third power line are disposed symmetrically on opposite sides of the first power line;

20               (b)   the first power line and second power line are substantially parallel;

              (c)   the second power line and the third power line each substantially has a width  $w$  and the first power line has a width equal to about twice the width  $w$ ; and

25               (d)   the plurality of power distribution structures are spaced substantially evenly across the portion of the surface.

2. The integrated circuit of claim 1 wherein a first separation distance between the first power line and the second power line is about equal to a second separation distance between the first power line and the third power line.

5 3. The integrated circuit of claim 1 wherein:

(a) the plurality of circuit blocks comprises:

(a1) a first circuit block; and

(a2) a second circuit block that is substantially disposed as a mirror image of the first circuit block; and

10 (b) a boundary of the first circuit block and a corresponding mirrored boundary of the second circuit block are offset a substantially equal distance from the plurality of power distribution structures.

15 4. The integrated circuit of claim 3 wherein the first circuit block comprises a logic circuit.

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5. An electronic device including a power distribution system, the electronic device comprising:

5 a plurality of substantially symmetrical power distribution structures associated with the power distribution system and distributed across at least a portion of a surface of the electronic device, wherein each of the plurality of power distribution structures comprises a first power line, a second power line, and a third power line; and

a plurality of circuit blocks coupled for receiving power through one or more of the plurality of power distribution structures.

10 6. The electronic device of claim 5 wherein:

the first power line provides a first power supply voltage; and

the second power line and the third power line provide a second supply voltage, wherein the second power line and the third power line are disposed substantially symmetrically on opposite sides of the first power line.

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7. The electronic device of claim 6 wherein the first power line and second power line are substantially parallel.

8. The electronic device of claim 6 wherein:

20 the second power line and the third power line each substantially has a width  $w$ ; and

the first power line has a width equal to about twice the width  $w$ .

25 9. The electronic device of claim 8 wherein a first separation distance between the first power line and the second power line is about equal to a second separation distance between the first power line and the third power line.

10. The electronic device of claim 7 wherein the plurality of power distribution structures are spaced substantially evenly across the portion of the surface.

11. The electronic device of claim 6 wherein:  
the first power supply voltage is a ground voltage; and  
the second power supply voltage is a positive voltage relative to the ground  
5 voltage.

12. The electronic device of claim 11 further comprising:  
a first power supply voltage pad disposed substantially at the surface of the  
electronic device and electrically coupled to at least one of the plurality of power  
10 distribution structures; and

a second power supply voltage pad disposed substantially at the surface of the  
electronic device and electrically coupled to at least one of the plurality of power  
distribution structures.

13. The electronic device of claim 12 wherein the electronic device is an  
integrated circuit chip and further comprising a power distribution ring, disposed around  
a substantial portion of the perimeter of the integrated circuit chip, electrically coupled  
to the first power supply voltage pad and to the plurality of power distribution  
structures.

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14. The electronic device of claim 12 wherein the first power supply voltage  
pad corresponds to the ground voltage and the second power supply voltage pad  
corresponds to the positive voltage.

25 15. The electronic device of claim 5 wherein the electronic device is selected  
from the group consisting of:

an integrated circuit; and

a printed circuit board assembly.

16. The electronic device of claim 5 wherein the plurality of circuit blocks is selected from the group consisting of:

a plurality of semiconductor chips mounted on a printed circuit board, wherein each of the semiconductor chips comprises a transistor; and

5 a plurality of transistor circuits disposed in an integrated circuit.

17. The electronic device of claim 5 wherein the plurality of circuit blocks comprises:

a first circuit block; and

10 a second circuit block that is substantially disposed as a mirror image of the first circuit block.

18. The electronic device of claim 17 wherein a boundary of the first circuit block and a corresponding mirrored boundary of the second circuit block are offset a  
15 substantially equal distance from the plurality of power distribution structures.

19. The electronic device of claim 18 wherein the first circuit block comprises a logic circuit.

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20. A method of designing an integrated circuit to be formed on a semiconductor chip, comprising:

preparing a layout for the integrated circuit comprising a plurality of symmetrical power distribution structures disposed across a substantial portion of the semiconductor chip wherein the plurality of power distribution structures are substantially linear, substantially parallel, and spaced substantially evenly across the substantial portion of the semiconductor chip; and

after preparing the layout comprising the plurality of power distribution structures, adding to the layout a plurality of circuit blocks coupled to receive power through one or more of the plurality of power distribution structures.

21. The method of claim 20 wherein each of the plurality of power distribution structures comprises:

a first power line for providing a first power supply voltage; and  
a second power line and a third power line for providing a second supply voltage, wherein the second power line and the third power line are disposed symmetrically on opposite sides of the first power line.

22. The method of claim 21 wherein:

the plurality of circuit blocks comprises a first circuit block and a second circuit block; and

adding to the layout the plurality of circuit blocks comprises designing the second circuit block substantially as a mirror image of the first circuit block.

23. The method of claim 22 wherein adding the plurality of circuit blocks comprises designing a boundary of the first circuit block and a corresponding mirrored boundary of the second circuit block to be offset a substantially equal distance from the plurality of power distribution structures.

24. The method of claim 22 further comprising varying the spacing of the plurality of power distribution structures depending at least in part on the layout sizes of the plurality of circuit blocks.

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25. A power distribution structure for providing power supply voltages to a plurality of circuit blocks in an integrated circuit, the power distribution structure comprising:

5 a first power line having a width  $w$  to provide a first power supply voltage to the plurality of circuit blocks;

a second power line, having a width equal to about one-half of width  $w$  and running substantially parallel to the first power line, to provide a second power supply voltage to at least a portion of the plurality of circuit blocks;

10 a third power line having a width substantially equal to about one-half of width  $w$  and running substantially parallel to the first power line and to the second power line, to provide the second power supply voltage to at least a portion of the plurality of circuit blocks; and

15 wherein the first power line, the second power line, and the third power line are symmetrically disposed about a center axis running substantially parallel to and inside the layout boundary of the first power line.

26. The power distribution structure of claim 25 wherein the first power line and the second power line run substantially parallel for a distance of more than about 50 microns.

27. The power distribution structure of claim 26 wherein a first separation distance between the first power line and the second power line is about equal to a second separation distance between the first power line and the third power line

25 28. The power distribution structure of claim 25 wherein:  
the first power line is electrically coupled to a first circuit block of the plurality of circuit blocks; and  
the second power line is electrically coupled to the first circuit block.



29. The power distribution structure of claim 28 wherein a substantially linear side of the perimeter of the first circuit block runs substantially parallel to the first power line for a distance of more than about 50 microns.

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30. An integrated circuit comprising:

a master circuit block layout;

an image circuit block layout;

5 a power distribution system comprising a first power distribution structure running substantially across the master circuit block layout and a second power distribution structure running substantially across the image circuit block layout; and wherein:

10 (i) the first and second power distribution structures are each substantially symmetrical about a central axis, substantially the same in shape, and each coupled to the power distribution system to provide first and second power supply voltages to the master and image circuit block layouts;

(ii) the image circuit block layout has a substantially identical layout to the master circuit block layout; and

15 (iii) the layout positions of the first and second power distribution structures relative to the corresponding master and image circuit block layouts is substantially symmetrical about a symmetry axis located between the master and image circuit block layouts.

20 31. The integrated circuit of claim 30 wherein the first and second power distribution structures each comprises:

a first power line having a width  $w$  to provide the first power supply voltage to the master and image circuit block layouts;

25 a second power line, having a width equal to about one-half of width  $w$  and running substantially parallel to the first power line, to provide the second power supply voltage to the master and image circuit block layouts;

a third power line having a width substantially equal to about one-half of width  $w$  and running substantially parallel to the first power line and to the second power line, to provide the second power supply voltage; and

wherein the first power line, the second power line, and the third power line are symmetrically disposed about the central axis.

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